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Deliveroo

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Delivery Noise Impact Assessment

On behalf of

deliveroo

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For and on behalf of Noise Solutions Ltd				

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01	31 Jan 2018	Clarification of operating hours and use of delivery holding area	NAC	JS
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1.0 Introduction

1.1. A Deliveroo kitchen is located within an existing building along Finchley Road in Swiss Cottage, London. Noise Solutions Ltd (NSL) has been commissioned to undertake a noise impact assessment in relation to the noise emissions from deliveries made from the kitchen.

1.2. Noise emission levels resulting from deliveries made from the site have been predicted at the nearest noise sensitive receptors to the site and assessed against the relevant local and national guidance.

1.3. Appendix A contains a guide to common acoustic terminology.

2.0 Details of development proposals

2.1. A Deliveroo kitchen is located on the ground floor of an existing building located on the western side of Finchley Road in Swiss Cottage, London.

2.2. Currently, eight kitchens operate at the site. There is potential to operate an additional kitchen in the future.

2.3. Operating hours are 08:30 to midnight, with cooking and deliveries out made between 17:00 and 23:00 Monday to Wednesday and between 12:00 and 23:00 Thursday to Saturday.

2.4. Meals from the kitchen are delivered to customers using a mix of pedal cycles and motor scooters. Vehicles enter and leave the site via the Swiss Cottage gyratory system: all entering traffic approaches from the south and all departing traffic leaves to the north. Scooters and cycles are parked at the entrance gates at the top of the ramp to the kitchen and riders collect deliveries from the store on foot.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site contains mixed residential and commercial properties. The nearest residential dwellings to the delivery route are:

- Flats on Dobson Close, immediately to the south of the access route (Receptor R1). The front windows of the flats, on Finchley Road, are approximately 6 metres from the parking area.
- Flats above the shops adjoining the proposed kitchen (Receptor R2). The windows at the front of the building, on Finchley Road, are approximately 4m from the parking area.

3.2. Appendix B contains an aerial photograph showing the site and surrounding area.

4.0 Existing noise climate

4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed delivery route, during the quietest times at which the kitchens will operate.

4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in Appendix C.

Table 1: Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	$L_{Aeq(15min)}$	$L_{Amax(15min)}$	$L_{A10(15min)}$	$L_{A90(15min)}$
Daytime (07.00 - 23.00 hours)	55-69	65-92	57-75	54-59
Operating hours (08.30 – 24.00)	55-69	65-92	56-75	54-59
Night-time (23.00 - 07.00 hours)	53-60	57-91	54-59	52-58

4.3. The noise climate at the measurement location was dominated by noise from existing plant serving other premises in the area. Noise levels at the windows facing Finchley Road are higher as they are not screened from traffic noise to the same extent as the measurement position. In order to be robust, however, the lowest $L_{A90,15min}$ background levels have been considered to be representative of the noise level at the windows overlooking the scooter parking area.

4.4. It should be noted that BS 4142:2014 *'Methods for rating and assessing industrial and commercial sound'* states the following with regard to the measurement of background noise levels;

> *Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.*

5.0 Noise design criteria

Noise Policy Statement for England

5.1. The Noise Policy Statement for England (NPSE), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse effects on health and quality of life;*
- *mitigate and minimise adverse effects on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

5.2. The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL (Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and quality of life occur.

5.3. The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the NPSE). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case: *"…all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development."*

5.4. Importantly, the NPSE goes on to state: "This does not mean that such adverse effects cannot occur."

5.5. The NPSE does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source, the receptor and the time in question. NPSE advises that: *"Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

5.6. It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also taking into account the specific circumstances of a proposed development.

National Planning Policy Framework

5.7. The National Planning Policy Framework (NPPF) was introduced in March 2012. The document sets out the Government's planning policies for England and how these are expected to be applied.

5.8. *Paragraph 123* of the *NPPF* states that planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*

- *mitigate and reduce to a minimum other adverse impacts on quality of life arising from noise from new development, including through the use of conditions;*

- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established [subject to the provisions of the Environmental Protection Act 1990 and other relevant law]; and*

- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

5.9. Furthermore, the NPPF gives weight to the requirements of the local authority as it states the following:

> *11. Planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise.*
>
> *12. This National Planning Policy Framework does not change the statutory status of the development plan as the starting point for decision making. Proposed development that accords with an up-to-date Local Plan should be approved, and proposed development that conflicts should be refused unless other material considerations indicate otherwise. It is highly desirable that local planning authorities should have an up-to-date plan in place.*
>
> *13. The National Planning Policy Framework constitutes guidance for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications.*

Planning Practice Guidance – Noise

5.10. As of March 2014, a Planning Practice Guidance (PPG) for noise was issued which provides additional guidance and elaboration on the aims of Paragraph 123 in the NPPF. The PPG advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur;

- Whether or not an adverse effect is occurring or likely to occur; and

- Whether or not a good standard of amenity can be achieved.

5.11. This guidance introduced the concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). NOAEL differs from NOEL in that it represents a situation

where the acoustic character of an area can be slightly affected (but not such that there is a perceived change in the quality of life). UAEL represents a situation where noise is 'noticeable', 'very disruptive' and should be 'prevented' (as opposed to SOAEL, which represents a situation where noise is 'noticeable' and 'disruptive', and should be 'avoided').

5.12. As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.

5.13. The LOAEL is described in PPG as the level above which "noise starts to cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life."

5.14. PPG identifies the SOAEL as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

5.15. In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to the noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that: *"…the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation."*

5.16. The relevant guidance in the PPG in relation to the adverse effect levels is summarized in Table 2:

Table 2: Summary of Effect Levels

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not Noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not Intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and Disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very Disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

5.17. This assessment will assess the impact of scooter deliveries from the kitchen in line with the NPPF. As the NPPF does not provide explicit objective assessment methodologies, various guidance documents and standards will be taken into account as summarized in the following section.

London Borough of Camden

5.18. The Camden Local Policy document dated 2017 states in Policy A1 'Managing the impact of development' that for noise and vibration:

> "Noise and vibration can have a major effect on amenity. The World Health Organisation (WHO) for example states that excessive noise can seriously harm human health, disturb sleep and have cardiovascular and behavioural effects. Camden's high density and mixed-use nature means that disturbance from noise and vibration is a particularly important issue in the borough.
>
> Where uses sensitive to noise are proposed close to an existing source of noise or when development that is likely to generate noise is proposed, the Council will require an acoustic report to accompany the application. Further detail can be found in Policy A4 -

Noise and Vibration and our supplementary planning document Camden Planning Guidance 6: Amenity."

5.19. Policy A4 'Noise and Vibration' states under the section titled 'Plant and other noise generating equipment' that:

> "Planning conditions will be imposed to require that plant and equipment which may be a source of noise is kept working efficiently and within the required noise limits and time restrictions. Air conditioning will only be permitted where it is demonstrated that there is a clear need for it after other measures have been considered (Policy CC2 Adapting to climate change). Conditions may also be imposed to ensure that attenuation measures are kept in place and are effective throughout the life of the development."

5.20. The policy document goes on to describe noise thresholds in Appendix 2 and states in the *'Industrial and Commercial Noise Sources'* section:

> "A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion)."

5.21. Table C of the appendix states the criteria at which development related noise levels will be acceptable:

Table C: Noise levels applicable to proposed industrial and commercial development (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dBL_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

BS 4142:2014

5.22. BS 4142:2014 *'Methods for rating and assessing industrial and commercial sound'* is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014 includes *"sound from the loading and unloading of goods and materials and industrial and/or commercial premises"*. The standard has been referenced as appropriate for the assessment of noise from deliveries made to or from commercial premises.

5.23. The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains *"a tone, impulse or other characteristic"* then various corrections can be added to the specific (source) noise level to obtain the *"rating level"*. Specifically, "Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

5.24. The likely effects of sound on people are assessed by subtracting the background noise level from the rating level. BS 4142:2014 states the following:

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.

5.25. This Standard provides recommended guideline values for internal noise levels within dwellings which are similar in scope to the guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999). These guideline noise levels are shown in Table 3, below.

Table 3: BS 8233 Desirable Internal Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00 hours	23:00 to 07:00 hours
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

5.26. BS 8233:2014 advises that: "regular individual noise events…can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values."

Guidelines for Community Noise, 1999 World Health Organisation, (WHO)

5.27. The (WHO) 1999 Guidelines for Community Noise also sets out guidance on suitable internal and external noise levels in and around residential properties. The following internal noise levels are recommended by the WHO in Table 4.1 (of the WHO document):

- 35 dB $L_{Aeq,T}$ in living rooms over a 16 hour day; and
- 30 dB $L_{Aeq,T}$ in bedrooms during the 8 hour night.

5.28. With respect to the night-time maximum noise levels, the WHO guidelines in Section 3.4 state:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night."

5.29. The guidelines refer to community noise which is also called environmental noise, residential noise or domestic noise. WHO states that this noise encompasses all sources except noise at the industrial workplace. Main sources of community noise include road, rail and air traffic, industries, construction and public work, and the neighbourhood. The main indoor sources of noise are ventilation systems, office machines, home appliances and neighbours. Typical neighbourhood noise comes from premises and installations related to the catering trade (restaurant, cafeterias, discotheques, etc.); from live or recorded music; sport events including motor sports; playgrounds; car parks; and domestic animals such as barking dogs.

6.0 Delivery scooter noise assessment

Sound pressure levels of activities associated with deliveries

6.1. The sound pressure levels associated with delivery scooter pass-bys were established by measurement of scooters at a similar Deliveroo kitchen. The sound pressure levels were normalised to a distance of 10m from the measurement position and have been converted to Sound Exposure Levels (SEL) for ease of comparison/calculation.

6.2. Traffic projections for the Deliveroo kitchen have been provided by i-Transport[1]. Based on studies of similar kitchens, the busiest one-hour period is expected to be 19.00 to 20.00 on Fridays, where there are anticipated to be 194 scooter movements, 100 in and 94 out.

6.3. Based on similar kitchens, the busiest day is likely to be Sunday, when a total of 1165 scooter movements is expected., with approximately equal numbers in and out.

6.4. The i-Transport assessment, and the noise impact assessment which follows, are based on all nine kitchens (i.e. the eight existing kitchens plus the potential one additional kitchen) operating at full capacity.

6.5. Table 4, below, details typical source noise levels, used within the assessment, with the data presented in terms of SEL. These values have been obtained by measurements made at other Deliveroo kitchens.

Table 4 Reference noise data for delivery activities (at 10m, 12.5% gradient)

Noise Source	SEL, dB(A)
Scooter pass-by (level)	57

Predicted impact

6.6. The information contained in Table 3 was used to 'build-up' a source noise level based on the number of activity events over the required assessment period using the following equation:

6.7. $L_{Aeq,T} = SEL + 10.\log\left(\frac{1}{T}\right) + 10.log(N)$ (Equation 1)

Where:
SEL is the L_{Aeq} over a one second period, and represents the noise energy from an event (e.g. scooter pass-by) compressed into one second;
T is the reference time period in seconds; and
N is the number of movements in the time period, T.

[1] E-mail from Gavin Murray, 9 Jan 2018

6.8. The residential dwellings nearest to the scooter parking area and entry and departure routes are noted in Section 3 of this report. The predicted cumulative L_{Aeq} noise level at each is shown in Table 5.

Table 5 Predicted delivery noise levels

Receptor	Predicted noise level at receptor, peak hour (dB)
R1	48 $L_{Aeq,1hr}$ (dB)
R2	52 $L_{Aeq,1hr}$ (dB)

6.9. It can be seen that the highest predicted noise level is at Receptor R2, the front windows of the flats above the shops to the north of the entrance.

6.10. Scooter noise associated with the kitchen will become anonymous noise sources once they mingle with general traffic, so will only be noticeable when on the ramp and immediately around the top of the ramp.

BS 4142:2014 Assessment

6.11. Table 6 below presents the initial assessment of the likely noise impact at Receptor R2 during the peak hour, in accordance with the BS 4142:2014 methodology. The noise impact at the other receptor will be 4 dBA lower

Table 6 Assessment of predicted external delivery noise levels using BS 4142:2014 during the daytime.

Results		Relevant Clauses of BS 4142:2014	Commentary
Background Sound level	L_{A90} = 54dB	8.1, 8.2	Lowest daytime background sound level measured during environmental durvey
Assessment made during the daytime, so the reference interval is one hour		7.2	
Specific Sound Level at R2	$L_{Aeq,T}$ = 52dB	7.3.6	Calculations presented above
Acoustic Feature Correction	3dB	9.2	Scooters will pass intermittently
Rating Level	(52+3) dB =55dB		
Excess of Rating Level over background sound level	(55-54) dB = 1dB		
Assessment of impact: low impact		11	

6.12. This indicates that noise from scooters is in the "Amber" category described in London Borough of Camden's guidance, quoted in Section 5 of this report, and falls within the "No Observed Adverse Effect" category in the PPG effects table above.

6.13. It should be noted that this is a worst-case assessment, since:

- The peak hourly traffic flow is compared with the lowest daytime background sound level;
- The background sound level was measured behind the shops, screened from Finchley Road (see Appendix B) and background noise levels at the front façade of the shops are expected to be higher than those measured.

6.14. The uncertainties related to the assessment are mainly concentrated on the assumptions in relation to the number of scooter movements and the prevailing background noise levels. As the assessment errs on the side of caution, the uncertainties related to the assessment should have a positive impact on the end result i.e. less noise impact compared to that predicted.

6.15. The context of this assessment may be explored by considering the absolute sound pressure levels. The existing ambient sound pressure levels and predicted sound pressure levels are examined within the BS 8233:2014 assessment below.

BS 4142:2014 and WHO assessment

6.16. A BS 4142:2014 assessment considers only external noise levels at the location of sensitive receptors and does not consider the attenuation offered by the building envelope.

L_{Aeq} assessment

6.17. Based on the methodology detailed in Section 6.7, worst case noise levels from the delivery scooter activities within each of the Receptors have been predicted and summarised in Table 7 below. The predicted sound pressure levels are internal and inclusive of a 15dB sound reduction for partially opened windows (as per guidance within BS 8233:2014).

6.18. The predictions for the daytime period from 07.00 to 23.00 hours are based on the total scooter traffic projections for the busiest day. The daytime equivalent continuous noise levels are those measured at the survey location shown in Appendix B. It is therefore likely that environmental noise levels (i.e. excluding scooter noise) within the flats on Finchley Road (R1A and R3A) will be higher than predicted.

Table 7 Summary of internal predicted noise levels with relevant guidance given in WHO documents and BS 4142:2014 for living rooms and bedrooms

	Receptor	
	R1	R2
	Predicted external noise level, dB $L_{Aeq,16hr}$	
Scooters only	44	48
Environmental noise only	60	60
	Predicted internal noise level, dB $L_{Aeq,16hr}$	
Scooters only	29	33
Environmental only	45	45
Total environmental and scooter noise	45	45
Target level	35	35
Increase due to scooters	0	0

6.19. The results from the environmental sound pressure level survey indicate that, with no delivery scooters, the measured $L_{Aeq,T}$ ambient noise levels exceed internal ambient noise targets as

stated in BS 8233:2014 and WHO Guidelines for Community Noise, 1999 during the daytime period, assuming partially opened windows.

6.20. The predicted $L_{Aeq,T}$ noise emissions due to the delivery scooters will not increase the ambient noise levels since the predicted scooter noise emission levels are significantly lower than the existing ambient noise level. This falls into the "No Observed Adverse Effect" category in the PPG effects table above.

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned by Deliveroo to undertake a noise assessment for deliveries made from the Deliveroo kitchen at Finchley Road in Swiss Cottage.

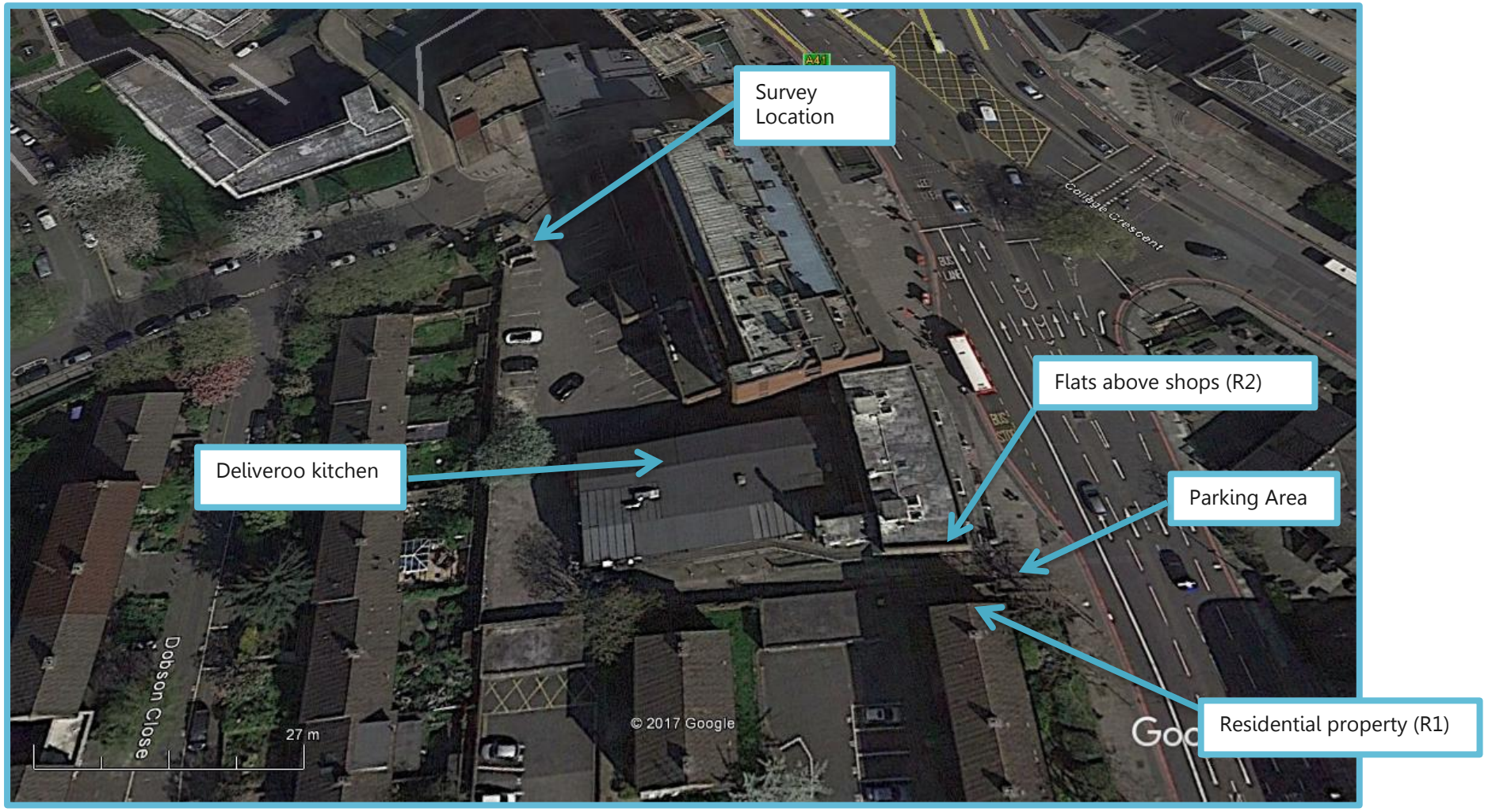
7.2. Predicted noise from the delivery scooters results in, at worst, a 'low impact' according to BS 4142:2014 and will not increase the internal noise levels within the nearest dwelling.

7.3. Therefore, noise from scooters deliveries should not be a reason for refusal to issue a Certificate of Lawfulness.

Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Aerial Photograph of site showing areas of interest



Appendix C Environmental sound survey

Details of environmental sound survey

C.1 Measurements of the existing background sound levels were undertaken from 12:00 hours on Wednesday 2 August 2017 and 10:00 hours on Thursday 3 August 2017.

C.2 The sound level meter was programmed to record the A-weighted L_{eq}, L_{90}, L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the survey.

Measurement position

C.3 The sound level meter was positioned on a lamppost at the rear of the building as shown in Appendix B. The microphone was positioned in free-field at a height of approximately 3.5m above ground level.

C.4 The adopted position is considered to be representative of the noise climate affecting the nearest noise sensitive premises to the site. The position was located at a similar distance and comparably screened from the dominant noise sources in the area, when compared to the nearest receptors assessed in this report.

Equipment

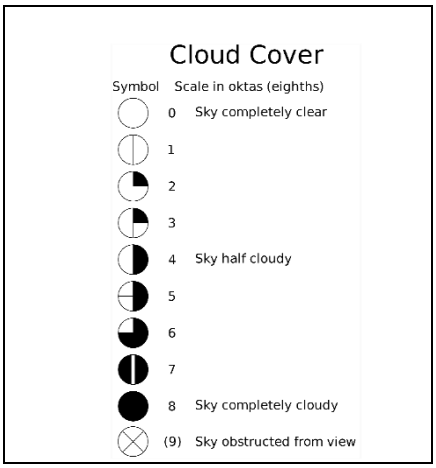
C.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Rion NL-52 / 00654035	21/09/2015	CONF091517
Condenser microphone	Rion UC-59 /08290		
Preamplifier	Rion NH-25 / 54080		
Calibrator	Rion NC-74 /34535932	21/09/2015	14746

Weather Conditions

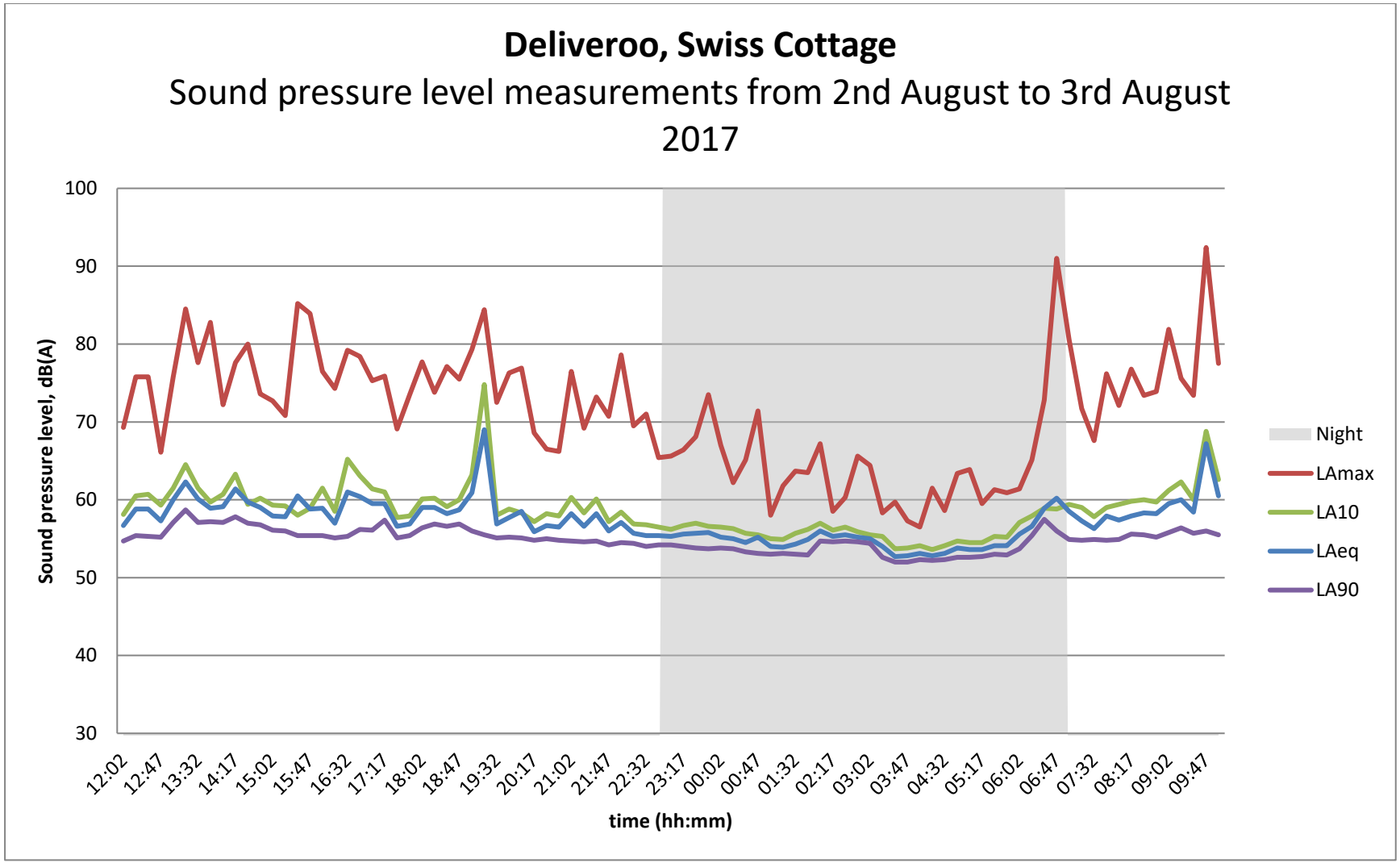
C.6 Weather conditions were determined both at the start and on completion of the surveys. It is considered that the meteorological conditions were appropriate for environmental noise

measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	**Date/Time**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	12:00 2/8/2017-10:00 3/8/2017	Temperature (°C)	20	19
		Precipitation:	Yes	Yes
		Cloud cover (oktas - see guide)	6	5
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	Yes	Yes
		Wind Speed (m/s)	8	5
		Wind Direction	North Easterly	South Westerly
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

C.7 The results of the survey are considered to be representative of background sound pressure levels at the façades of the nearest noise sensitive receptors to the scooter parking area, during the quietest times at which the plant will operate. The noise climate during the survey period was dominated by road traffic movements and plant noise emissions from neighbouring premises. The results of the survey are presented in a time history graph overleaf.


Deliveroo, Swiss Cottage
Sound pressure level measurements from 2nd August to 3rd August 2017
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
12:02
12:47
13:32
14:17
15:02
15:47
16:32
17:17
18:02
18:47
19:32
20:17
21:02
21:47
22:32
23:17
00:02
00:47
01:32
02:17
03:02
03:47
04:32
05:17
06:02
06:47
07:32
08:17
09:02
09:47
time (hh:mm)
Night
LAmax
LA10
LAeq
LA90